



## GOVERNMENT COLLEGE OF ENGINEERING, JALGAON

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Name of Examination : **Summer 2021** - (Preview)

Course Code & Course Name : **ME451 - Finite Element Method**

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Maximum Marks : **60**

Duration : **3 Hrs**

[Edit](#) [Print](#) [View Answer Key](#) [Close](#) **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. All questions are compulsory.
2. Illustrate your answer with suitable figures/sketches wherever necessary.
3. Assume suitable additional data; if required.
4. Use of logarithmic table, drawing instruments and non programmable calculators is allowed.
5. Figures to the right indicate full marks.

### 1) Solve any three question

- a) Explain the different types of elements used in FEA along with sketch, degree of freedom per node, number of nodes and its application [6]
- b) What is boundary conditions? Explain its types [6]
- c) Write note on plane stress and plane strain [6]
- d) Derive shape functions for one dimensional elements [6]

### 2) Solve any three question

- a) Explain in detail preprocessing, processing and post processing [6]
- b) Explain matrix analysis of one dimensional (spar or rod or truss) elements [6]
- c) Explain various type of system [6]
- d) Write notes on finite difference method [6]

### 3) Solve any three question

- a) Explain basic steps used in finite element formulations [6]
- b) The two noded one dimensional element has node 1 & 2 located at the distance of 200 mm and 360 mm respectively from Y axis. The displacement of nodes 1 & 2 are 0.03 and -0.05 mm respectively. At point P, located at a distance 40 mm from node 1 within the element, determine 1) Natural coordinate 2) Linear shape function 3) Displacement. [6]
- c) Explain principles used in modelling [6]
- d) What are the advantage and limitations of simulations [6]

### 4) Solve the following

- a) What are the properties of Global stiffness matrix [3]
- b) Write note on Elimination approach used in FEA [3]

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